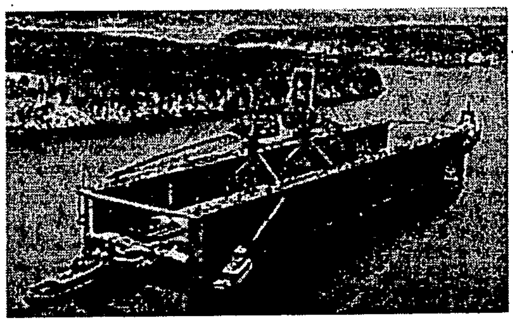
TowLine

Tow Line Magazine (2000-2001)

The Magazine of Moran Towing Corporation

MORAN ASSISTS SMIT WITH FLOATING DRYDOCK



Moran helps Smit International on the final phase journey from Shanghai, China to Bath, Maine

In February, 2001, off the coast of Maine near the entrance to the Kennebec River, three of Moran's la rendezvoused with Smit International's 250 foot 22,000 horsepower tug, Smitwijs London to tow a 75 wide floating drydock up the Kennebec River to the Bath Iron Works General Dynamics Facility. Bath I leading designer and builder of technologically advanced naval ships, including the AEGIS destroyer. T become a main component of the Bath Iron Works' new state of the art land-level ship transfer facility Smitwijs London and the drydock left the coast of China in August, 2000. Although the trip from China originally scheduled to take 90 days, a typhoon off the coast of Korea caused the drydock to break aw London and float free for three days. To assess the damage and make repairs, the drydock was taken where it encountered a second typhoon. Further delays occurred when the drydock met with gale forc of Maine ultimately causing the trip from China to Maine to last six months.

The 10 mile trip up the Kennebec River proved equally difficult. In some locations the river was barely drydock. The shallow draw (6 feet) and the destabilizing effect of the two large cranes that rise high a drydock combined to make the river passage technically challenging for all of the tugs involved in the London was joined by the Joan Turecamo and Kimberly Turecamo from Moran's New York fleet and th Moran's Virginia fleet. In addition to the three Moran tugs, off the mouth of the Kennebec River a fifth local Portland company tied on. One additional local tug from Portsmouth, the Alice Winslow, ran alon needed during the last phase of the tow. It is thought that this drydock may have been the largest str up the Kennebec River. During the river passage, representatives from the Chinese company that buil aboard along with river pilots and line handlers while docking pilots were on the tugs.

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Exhibit A

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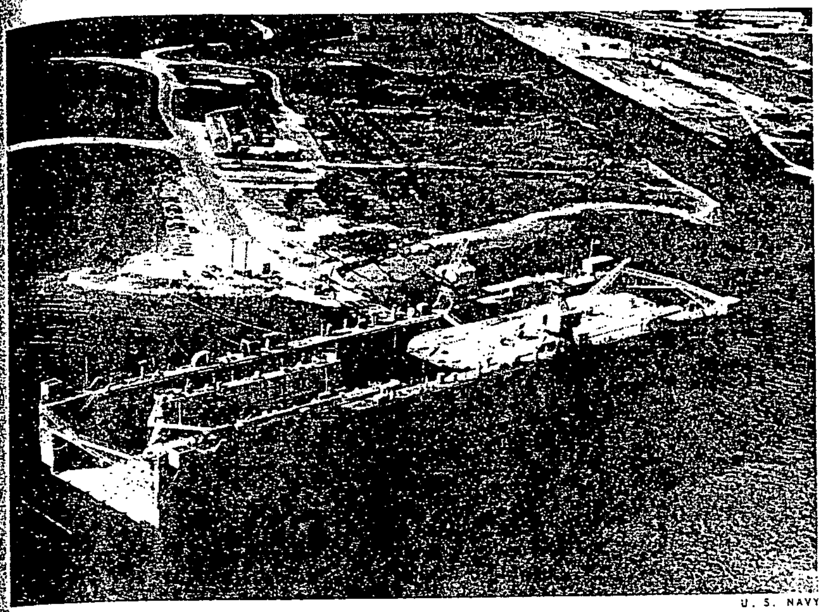
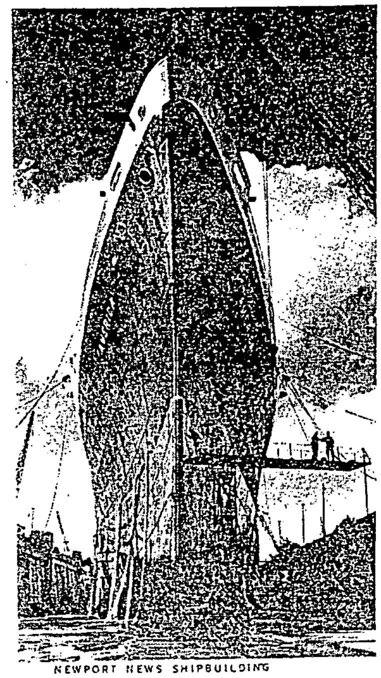


U. S. NAVY



NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.

FLOATING DRY DOCK (*above*) and graving dock (*right*) are two types of structures used for providing workmen with access to the underwater parts of large ships' hulls.

DRY DOCK, a concave structure in which a ship is supported out of water on blocks so that maintenance and repair work can be done on its underside. A *graving dock* is a walled basin built into the shore; a *floating dry dock* is a buoyant structure that can be lowered and raised in the water to receive and lift a ship. Both kinds of dry docks can be filled with water and emptied.

GRAVING DOCK

In docking a ship within a graving dock, the basin is filled with water, the ship is floated into the dock, and then an entrance gate is closed. As the water is removed by pumping, the ship settles on blocks on the dock floor. The blocks support the ship while maintenance and repair work is done, utilizing mechanical and electrical service outlets and hoisting equipment on the periphery of the dock. After repair work is completed, the dock is flooded, the gate is opened, and the ship is floated out.

Emptying and Filling Systems. A graving dock (see illustration) has two sidewalls that have tunnels and openings for water flow in emptying and filling the basin; an additional means of filling often is provided by openings in the entrance gate. The water flow is regulated by electrically or hydraulically operated sluice gates and gate valves. Pumps located in one sidewall usually empty the basin in 1.5 to 2.5 hours. Filling takes about 1 hour.

Entrance Gate. The floating-caisson entrance gate, the commonest type in the United States, has ballast tanks for lowering and raising it in dock seats. Caisson gates that slide or roll into position are commonly used in England.

Ship Positioning Equipment. Power capstans and cables, placed at intervals around the periphery of the basin, are used to maneuver a ship into position over the blocks before the dock is unwatered. One capstan can pull a load as great as 30,000 pounds (13,600 kg).

Blocks. After a ship is properly centered in the dock and the water is removed, the ship settles on blocks previously arranged so that they conform to the hull profile of the ship being docked. One line of blocks, called keelblocks, is located along the dock centerline; other lines of blocks, called bilge blocks, are located off the centerline. The blocks, which are made of wood, cast iron, and steel, rise 3.5 to 5.5 feet (1–1.6 meters) above the dock floor. Besides supporting the dead weight of the ship they provide a level base and give workmen access to the underside of the ship.

Service Outlets and Hoisting Equipment. Along the service altar, outlets are located in groups to supply electric lighting and power, steam compressed air, fresh and salt water, and gases for metal-cutting torches. These outlets are connected to flexible lines to carry the services to work locations on the ship.

All heavy materials for a dry-docked ship are handled by cranes that operate from tracks along the dock sidewalls. A traveling crane has a lifting capacity in the range from 20 to 75 tons (18–68 metric tons).

Design and Construction. The design of a graving dock strongly depends on the rock and soil conditions at the site. Bearing piles are needed if there are soft materials below the floor. Where water is present in the soil, provisions must be made for resisting or relieving the water pressure on the underside of the dock floor.

Graving docks are constructed either in open excavations or by underwater concreting. Open excavations are kept dry by the combined use of wells, well points, and pumps. Underwater concreting, used where it is not feasible to exclude water from the site, requires lowering of special formwork to receive concrete through large pipes called tremies.

History. The Phoenicians and Egyptians repaired a small vessel by bringing it into a cove at high tide and allowing it to settle on the bottom at ebb tide. The Greeks sometimes floated a vessel into an excavation made on the

Exhibit B

shore and then built an earth dam across the entrance and removed the water in the basin.

The first graving dock in England, built at Portsmouth in 1495, had crude entrance gates and also timber walls backed with stone. In the United States, durable stone-masonry dry docks were in use by 1840, and several timber docks were built in the 1850–1900 period. Reinforced concrete is used for building most modern graving docks.

FLOATING DRY DOCK

A floating dry dock basically consists of a bottom pontoon and two sidewalls subdivided into compartments to provide stability while lifting ships. It is lowered in the water to accommodate ship entry by flooding the compartments, and it is raised by pumping the water out.

Floating dry docks normally are towed from place to place and are operated at a berth alongside a pier or wharf where they can be supplied with mechanical and electrical services. Some military dry docks that are self-propelled have living quarters, electrical and mechanical services, and traveling cranes on board.

Types. A single-section floating dry dock, which either has open ends or has one closed end and one gated end, has two single-section sidewalls. Its main advantages are rigidity, simplicity, and the use of only one pumping plant.

A multisection floating dry dock has two multisection sidewalls. Separate sections, each about the same length, are joined to form a single dry dock that has the required total length and lifting capacity. Each section has its own buoyancy chambers, ballast compartments, and pumping plant. Some multisection steel dry docks are capable of lifting a battleship.

History. Floating dry docks made of wood and shaped like a hull were in use by 1785; they apparently were first made from sterns cut off from hulls. Floating dry docks made of iron were introduced about 1860. During World War II, many timber and steel, and some concrete, dry docks were built to meet military needs. Modern floating dry docks most commonly are made of steel.

JAMES R. AYERS and RALPH C. STOKES
Formerly, U. S. Navy Bureau of Yards and Docks

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DRY FARMING is the production of crops without irrigation in semiarid climates or areas of limited rainfall. Dry farming, because of moisture limitations, is a specialized system of farming involving many soil management and crop production practices not followed in irrigated or in humid areas. Under dry farming a vigorously growing crop uses up all the available water from the root zone by the time of harvesting.

The boundaries marking dry farming regions from those of humid farming and desert areas are not clear-cut because of modifying factors such as soil characteristics, rainfall distribution, and temperature. In general, dry farming in the cooler climates is practiced in the 10- to 20-inch (25- to 50-mm) rainfall belts, whereas in warmer climates, areas having as much as 30 inches (75 mm) of annual precipitation are classified as dry farming regions. Actually, slightly more than one quarter of the earth's surface receives 10 to 20 inches (25 to 50 mm) of precipitation annually. Dry farming is widely practiced in Argentina, South Africa, southern Australia, Manchuria, Outer Mongolia, the Soviet Union, the Prairie provinces of Canada, and in many parts of the western United States.

HISTORY

Dry farming has long been practiced in many arid and semiarid regions of the world. In the dry lands of ancient Greece and Italy, farmers found that they could conserve the moisture of the soil by plowing the land to keep the surface layers powdery. Despite these efforts, dry farming produced only limited crop yields and it was not until the mid-19th century that dry farming methods were developed sufficiently to cultivate crops on a large scale in the vast plains of the dry temperate regions. This article deals with the development of dry farming practices in the western United States; these practices were subsequently adapted to or independently developed for similar regions.

The first North Americans to grow crops extensively on dry lands were the early settlers in Utah who, about 1865, began developing special techniques for growing crops on arid land. Within 15 to 20 years dry farming became an established system in many of the unirrigated portions of that state. Dry land cultivation in California and the Pacific Northwest commenced about 1870. Colonization of much of the semiarid parts of Kansas and Nebraska was attempted without success in the 1880's. Only after three decades did this vast plains area become more or less permanently settled.

Today, dry farming in the western part of the United States embraces an area of 450,000 square miles (1,165,500 sq km), approximately two thirds or 300,000 square miles (777,000 sq km) of which is tillable agricultural land of potentially great productive capacity. The dominant cash crop in this region is wheat.

In 1900, the U. S. Department of Agriculture initiated a series of botanical and ecological investigations in the dry farming areas of the Great Plains. These developments paralleled a bitterness over whether the plains should continue primarily as a ranch country. Secretary of Agriculture James Wilson and others became concerned over the plight of settlers pouring into the Great Plains region, as they were without training suited to the area, and there existed no body of information on which to plan and build a stable agriculture. This need served as the impetus for the establishment of the Office of Dry Land Agriculture in 1906 as a part of the U. S. Department of Agriculture. Soon thereafter, arrangements were completed for cooperative investigations at six existing state substations and for the establishment of federal dry land stations where no state facilities were available.

In the years that followed, these publicly supported federal and state research centers had a profound influence on the development and stabilization of dry farming operations in the Western states. Many practical and theoretical problems found answers. First, emphasis was placed on gathering information on the relationship among moisture storage, seasonal crop conditions, and crop yields; on an e
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VOLUME 9 Desert to Egret

THE ENCYCLOPEDIA AMERICANA

INTERNATIONAL EDITION

COMPLETE IN THIRTY VOLUMES FIRST PUBLISHED IN 1829

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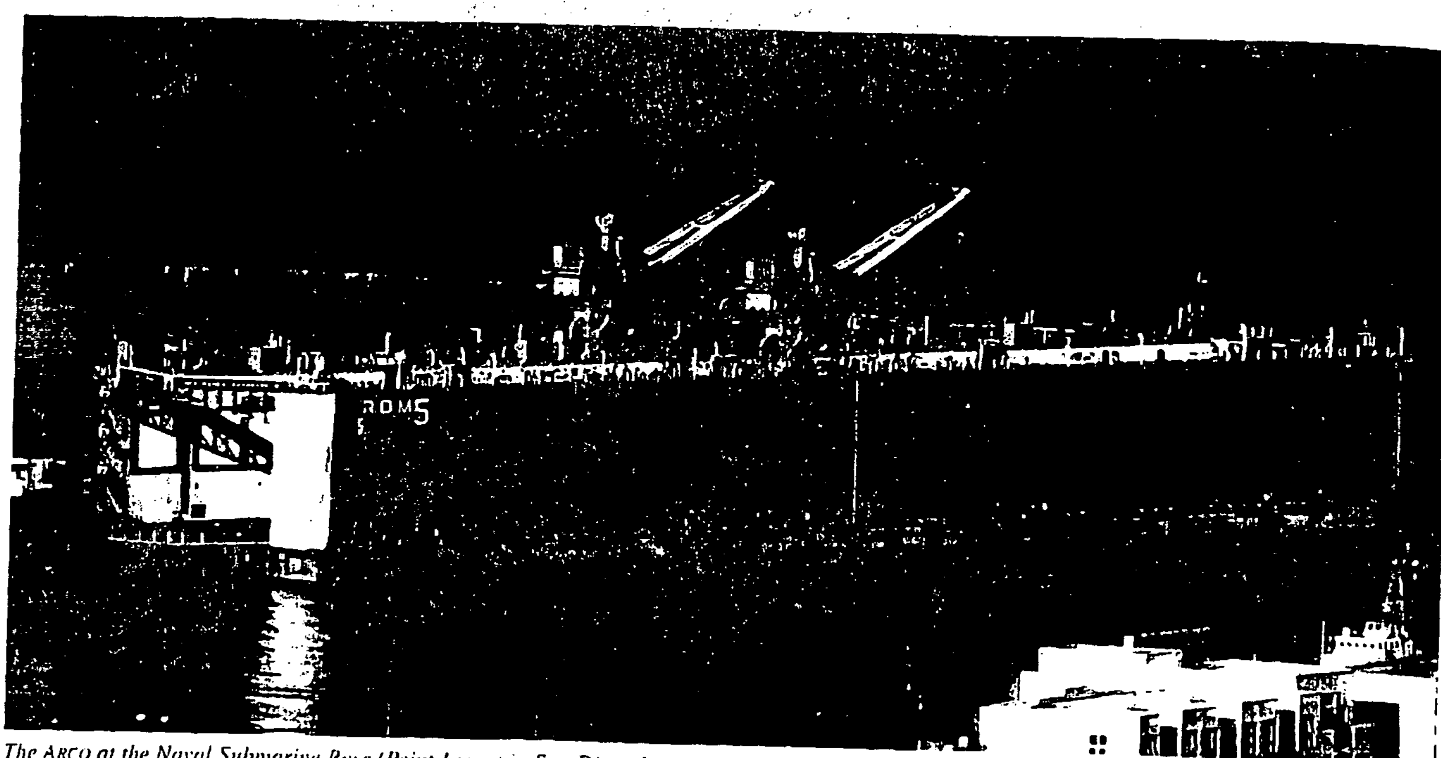
CHAPTER 26

Floating Dry Docks



The ARCO at the Naval Submarine Base (Point Loma) in San Diego has an unimposing appearance. Still, dry docks—military and civilian, floating and fixed—are vital to the support of the operating fleet. The two cranes ride on tracks atop the dock's sidewalls. (2004, W. Michael Young)

The Navy operates floating dry docks at several bases in the continental United States, primarily for the repair and maintenance of submarines. These are non-self-propelled docks, but they have electrical generators to provide power for their lighting, tools, and equipment. Normally they operate with a flotilla of non-self-propelled barges that provide specialized services, such as messing and berthing, for the docks themselves and for ships being dry-docked.

Like the Navy's ships and service craft, the number of dry docks has been reduced in the post–Cold War era. The floating docks in this chapter are arranged according to their classifications. The docks in active Navy service have their locations indicated; several others are on lease from the Navy and operated by commercial firms. One ex-Navy dock, the former OAK RIDGE (ARDM 1, ex-ARD 19) is in Coast Guard service.

Floating dry docks officially are considered to be service craft: they are listed in both the Naval Vessel Register (NVR) and the Service Craft and Boat Accounting Report (SABAR).

Classification: IX 521, 522, 524, and 525 were assigned to AFDB dock sections in 1996–1997. The rationale for this change has not been given by the Navy, but it relates to the extensive modification of the IX 524 as a mobile at-sea sensor platform.

Many existing U.S. floating dry docks were reclassified on 1 August 1946, several of which remain on the NVR:

World War II	*Post–1946*
ABSD	AFDB
ARD	AFDL/ARD
ARDC	AFDL[1]
AFD	AFDL
YFD	AFDM and YFD

Design: All U.S. Navy floating dry docks are open-ended, through-type docks, except for the ARD series. The ARDs are distinctive in being closed at one end by a ship-shaped bow.[2]

The large ABSD/AFDB-series docks are sectional, to facilitate disassembly and towing. Mounted on their hull sections—which are called "pontoons"—are side or "wing" walls that fold down for storage or towing. These wing walls can be shifted easily between pontoons in the event of damage.

1 Initially, these were referred to as AFDL(C).

2 The ARD-type docks also are referred to as Camel docks, for a ship of that name that was gutted and fitted with a stern gate in 1700 to serve as a dock at the Russian harbor of Kronshtadt (near St. Petersburg/Leningrad). The project was undertaken by a captain in the Royal Navy because of the lack of docking facilities at Kronshtadt, which is now a major Russian naval base.

Exhibit C

Γhe lift capacities listed in this chapter are nominal: much vier ships can be lifted if the distribution of ship weight is ›rable.

Guns: No floating dry docks are armed, although some original- ‹ere fitted to mount light anti-aircraft guns.

Names: Floating dry docks were unnamed until the 1960s. Dry ks that service nuclear-propelled submarines have been given names of towns and cities associated with nuclear power; most he others that are named have positive trait names.

Operational: Operational docks are manned by Navy personnel.

‹RGE AUXILIARY FLOATING DRY DOCKS

en of the floating dry docks in this category (AFDB 1–7) were lt during World War II; the AFDB 8 and 9 were acquired much :r.

The ABSD 1–7 (later changed to AFDB 1–7) were intended to towed in sections to advance bases to be assembled and then to vice the Navy's largest warships. The ABSD 1 and ABSD 2 re the largest, being ten-section docks intended to lift battleships he Iowa (BB 61) class and aircraft carriers of the Midway (CVB class; the ABSD 3 had nine sections, and the others were en-section docks. The ABSD 1 was completed in 1943, the ‹SD 2–6 in 1944, and the ABSD 7 in 1945. A planned eighth ›SD was canceled.

The following notes refer to the AFDB 1–7:

Classification: These docks originally were designated ABSD :h the same hull numbers; they were reclassified AFDB in ıgust 1946.

Design: All feature steel construction. The large wing walls can ›pport cranes and, as built, anti-aircraft (AA) guns (authorized nament when built was a twin 40-mm Bofors AA mount on each ction).

The ABSD 1–3 had the capacity to lift any World War II–era U.S. warship; the ABSD 4–7 could lift Iowa-class battleships and Essex (CV 9)-class aircraft carriers.

Dock	*Sections*	*Lift capacity*
ABSD 1, 2	10	90,000 tons
ABSD 3	9	81,000 tons
ABSD 4–7	7	55,000 tons

The following characteristics apply to standard dock sections:

Displacement:	15,400 tons
Length:	approx. 93 feet (28.35 m) overall approx. 82½ feet (25.15 m) on pontoon
Beam:	256 feet (78.05)
Width clear inside:	133⅔ feet (40.73 m)
Draft:	9 feet (2.74 m) light surface 68 feet (23.78 m) max submerged

Names: Names were assigned to two of these docks in the 1960s. AFDB 1 became the Artisan and AFDB 7 the Los Alamos.

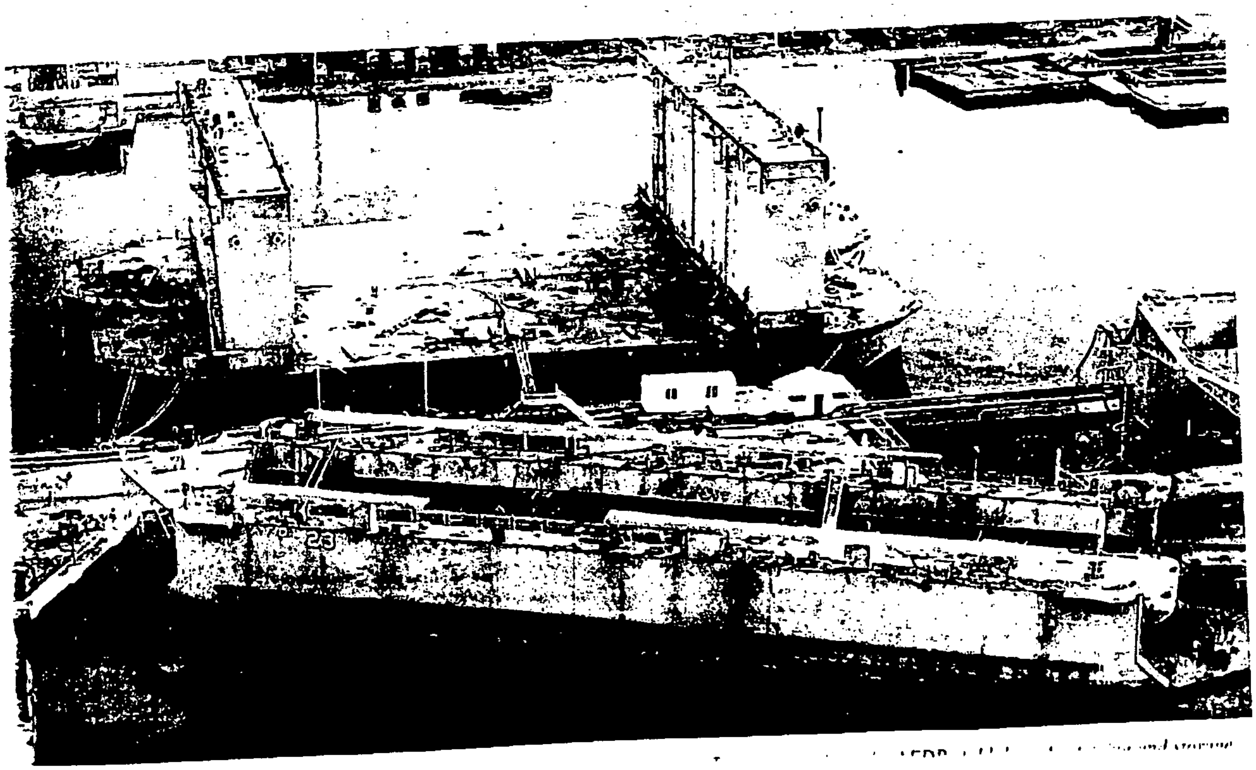
Operational: AFDB 7 sections A-B-C-D were reactivated from the reserve fleet in 1961 and towed across the Atlantic in February–March 1961 for use at the Holy Loch (Scotland) SSBN refit base. AFDB 7 sections were in use at Holy Loch for 30 years, until the forward base there was disestablished in 1992.

AFDB 9

The unnamed AFDB 9 is a civilian-built, two-section dock acquired by the Navy in 1974. She has been on commercial lease since 14 June 1993, operated by Metro Machine Corp. in Norfolk, Virginia.

The AFDB 9 was taken over by the Navy and placed on the NVR effective 12 July 1990. The dock had been operated by Pennsylvania Shipbuilding Co. and was acquired by the Navy when that firm defaulted on Navy contracts.

See 16th Edition/page 327 for characteristics.



EIGHTEENTH EDITION

THE NAVAL INSTITUTE GUIDE TO THE Ships and Aircraft of the U.S. Fleet

Norman Polmar

Samuel Loring Morison, Senior Researcher—Ships
Richard R. Burgess, Senior Researcher—Aviation
Julie Olver, Managing Editor

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